Sustainability in Road Construction: Using Bamboo Straw Ash to Improve the Index Properties of Lateritic Soil

BUSARI Ayobami, Oyedepo, Joseph,OFUYATAN Olatokunbo, NURAIN Suleiman, AJAYI Samuel,Oti Miracle N. Sustainability in Road Construction: Using Bamboo Straw Ash to Improve the Index Properties of Lateritic Soil. European Journal of Sustainable Development. ACCEPTED FOR PUBLICATION. ISI Thompson Reuters. (With Impact Factor).

[1(a)]BUSARI Ayobami, [(1b)]Oyedepo, Joseph,[2(b)]OFUYATAN Olatokunbo, [2(c)]NURAIN Suleiman, [2(d)]AJAYI Samuel, [2(e)]Oti Miracle N.

[1, 2(b), 2(e)] Department of Civil Engineering, Covenant University Ogun State, Nigeria.
[1(b)] Department of Civil Engineering, Federal University of Technology, Akure, Nigeria
[2(c),2(d)] Nigeria Building and Road Research Institute, Ota.

[1]*Corresponding Author:* ayobami.busari@covenantuniversity.edu.ng

ABSTRACT

In a bid to improve sustainability in road construction and reduce the cost of road construction, there is a need for a green alternative. This research improved the geotechnical properties of tropical lateritic soil using Bamboo Straw Ash (BSA). The lateritic soil was stabilized with increasing percentage of BSA at 0%, 2%, 4%, 6%, 8%, 10%, and 12%. The index properties, Compaction (Maximum moisture content, Maximum dry Density), CBR, of the soil samples with BSA were evaluated. Response Surface Analysis was used to model the mathematical relationship between the atterberg limit and the CBR of the BSA stabilized soil sample. The plasticity index of the unstabilized soil sample was 14.01 upon the addition of 16% BSA, the plasticity index reduced to 10.73 which showed an improvement in the soil index properties. The CBR increased from 26.38% to 30.2% at 0% and 8% respectively which signifies an improved strength. From the Respons Surface Analysis, the highest plasticity index achievable with BSA stabilization is 27.18. The model equation showed that the plasticity index and plasticity limit have a positive relationship with the CBR. Ultimately, the use of BSA provides a cost-effective and green alternative to lateritic soil stabilization in road construction.

Keywords: Bamboo straw ash, soil stabilization, strength properties, compaction, Pavement material